

## CLAIMS

1. A device for growing a plant or germinating a seed into a plant, wherein said plant may have one or more roots, said device comprising:
- 5 a) a vessel for containing a liquid;
- b) a means for removably suspending said plant in a gas above said liquid;
- c) a means for elevating a first portion of said liquid above the remaining liquid in said vessel and into said gas wherein said first portion of liquid falls through said gas into said remaining liquid; and
- 10 d) a means for contacting a second portion of said liquid with said plant, seed, or a growth medium contacting said plant or seed and allowing said second portion of liquid to return to the remaining liquid;
- whereby said one or more roots are permitted to grow in said gas and in said remaining liquid.
2. The device of claim 1 wherein said means for contacting said second portion of liquid with said plant, seed, or growth medium comprises delivering said second portion of liquid to a channel in a net basket.
3. The device of claim 1 wherein said means for elevating or means for delivering or both comprises a conduit.
4. A device for growing a plant or germinating a seed into a plant, wherein said plant has one or more roots, said device comprising:
- 20 a) a vessel for containing a liquid;
- b) a means for removably suspending said plant in a gas above said liquid;
- c) a conduit in fluid communication with said liquid and said gas; and
- 25 d) a means for delivering a first portion and a second portion of said liquid through said conduit whereby said first portion of liquid falls through said gas into the remaining liquid in said vessel and said second portion of liquid contacts said plant, seed, or a growth medium contacting said plant or seed, and descends into said remaining liquid;
- whereby said one or more roots are permitted to grow in said gas and in said remaining liquid.
- 30 5. The device of claim 4 wherein said first portion of liquid falls in drops or streams.
6. The device of claim 5 wherein said drops have diameters greater than about 200 microns, greater than about 350 microns, greater than about 500 microns, greater than about 1000 microns, greater than about 2000 microns, or greater than about 5000 microns.
7. The device of claim 4 wherein said conduit is also in fluid communication with said liquid and said plant, seed, or growth medium contacting said plant.
- 35 8. The device of claim 4 further comprising a means for delivering a third portion of said liquid through said conduit whereby said third portion of liquid falls through said gas, is permitted to contact said one or more roots, and contacts said remaining liquid.

9. The device of claim 4 wherein said second portion of liquid contacts said plant, seed, or said growth medium at about or below the height of said seed or transition region of said plant.
10. The device of claim 4 for growing more than one plant.
11. The device of claim 10 comprising a means for delivering said second portion of liquid to each of a plurality of plants separately.
12. The device of claim 4 wherein said first portion of liquid only contacts said gas and said remaining liquid.
13. The device of claim 4 wherein said conduit has separate first and second exits for said first and said second portions of liquid.
14. The device of claim 4 wherein said means in step d) comprises a pump.
15. The device of claim 4 wherein said first portion of liquid is delivered substantially vertically downward.
16. The device of claim 4 wherein said first portion of liquid falling through said gas into said remaining liquid increases the dissolved oxygen content of said remaining portion of liquid or said first portion of liquid or both.
17. The device of claim 4 wherein said first portion of liquid falling into said remaining liquid increases negative ions within said device.
18. The device of claim 4 wherein said liquid and said one or more roots are completely contained in one vessel.
19. The device of claim 4 further comprising a means for intermittently delivering said first and second portions of liquid.
20. The device of claim 19 wherein said intermittently delivering comprises an on cycle and an off cycle wherein said on cycle is about twice as long as said off cycle.
21. The device of claim 4 further comprising a means for delivering photoradiation to said plant, seed, or cutting.
22. The device of claim 4 further comprising an aspirator or a downdraft venturi.
23. The device of claim 4 also comprising a means for dampening the sound produced when said first or said second, or both portions of liquid descend into said remaining liquid.
24. The device of claim 23 wherein said means for dampening sound produced by said second portion of liquid descending comprises a terraced aerator.
25. The device of claim 23 wherein said means for dampening sound produced by said first portion of liquid descending comprises an enclosure for said descending first portion of liquid.
26. The device of claim 4 also comprising:
  - a) a terraced aerator comprising one or more terraces; and
  - b) a means for suspending said terraced aerator below a portion of said plant or a growth medium contacting said plant in said gas above said liquid;
 wherein said second portion of liquid contacts said plant or said growth medium and descends to said first terrace, then descends from said first terrace into said remaining liquid.
27. The device of claim 4 also comprising:

- a) a terraced aerator comprising: two or more terraces; and a means for suspending said first terrace above said second terrace; and
  - b) a means for suspending said terraced aerator below a portion of said plant or a growth medium contacting said plant in said gas above said liquid;
- 5 wherein said second portion of liquid contacts said plant or said growth medium and descends to said first terrace, then descends from said first terrace to said second terrace, and then descends from said second terrace into said remaining liquid.
- 28. The device of claim 27 wherein said second portion of liquid descends from said first terrace to said second terrace or from said second terrace to said remaining liquid, or both, in drops
- 10 or streams.
- 29. The device of claim 28 wherein said liquid descending in drops or streams to said second terrace or descending into said remaining liquid produces a sound of less than about 57 decibels.
- 30. A method for growing a plant or germinating a seed into a plant, said method comprising:
  - 15 a) providing a device of claim 4;
  - b) delivering a first portion and a second portion of said liquid through said conduit whereby said first portion of liquid falls through said gas into the remaining liquid in said vessel and said second portion of liquid contacts said plant, seed, or a growth medium contacting said plant or seed, and descends into said remaining liquid; and
  - 20 c) providing nutrients, carbon dioxide, oxygen, and light to said plant;
 whereby said plant grows and a root of said plant is permitted to grow in said gas and in said remaining liquid.
- 31. A kit for growing a plant comprising the device of claim 4 and instructions for using said device.
- 25 32. A kit for growing a plant or germinating a seed into a plant, said kit comprising:
  - a) a device for growing a plant or germinating a seed into a plant wherein said plant has one or more roots comprising:
    - 1) a vessel for containing a liquid;
    - 2) a means for removably suspending said plant in a gas above said liquid;
    - 30 3) a conduit in fluid communication with said liquid and said gas; and
    - 4) a means for delivering a first portion and a second portion of said liquid through said conduit whereby said first portion of liquid falls through said gas into the remaining liquid in said vessel and said second portion of liquid contacts said plant, said seed, or a growth medium contacting said plant or
    - 35 seed, and descends into said remaining liquid;
  - whereby said one or more roots are permitted to grow in said gas and in said remaining liquid; and
  - b) instructions for using said device.
- 33. The kit of claim 32 also comprising a component selected from the group consisting of:

terraced aerators, aspirators, downdraft venturis, net baskets, germination caps, sets of germination caps, seed bearing support media, and smart garden devices.

34. A method for growing a plant or germinating a seed into a plant, wherein said plant has at least one root, said method comprising:

- 5           a) providing a vessel for containing a liquid;  
          b) providing a means for removably suspending said plant in a gas above said liquid;  
          c) providing a conduit in fluid communication with said liquid and said gas; and  
          d) providing a means for delivering and delivering a first portion and a second portion of  
10       said liquid through said conduit whereby said first portion of liquid falls through said  
          gas into the remaining liquid in said vessel, and whereby said second portion of liquid  
          contacts said plant, said seed, or a growth medium contacting said plant or seed, and  
          descends into said remaining liquid;

whereby said root of said plant is permitted to grow in said gas and in said remaining liquid.

35. The method of claim 34 wherein said means for delivering and delivering said second portion  
15 of liquid through said conduit whereby said second portion contacts said plant, said seed, or  
said growth medium comprises:

- a) providing a net basket for supporting said plant or seed, said net basket comprising a  
          liquid inlet and a channel having a vertical component for transporting said liquid;  
          b) delivering said liquid from said conduit to said liquid inlet;  
20       c) transporting said liquid through said liquid inlet to said channel having a vertical  
          component;  
          d) transporting said liquid through said channel having a vertical component; and  
          e) contacting said plant or seed with said liquid;

25       wherein said plant grows and wherein one or more roots of said plant and said liquid are  
allowed to exit through one or more holes in said net basket.

36. The method of claim 34 wherein said first portion of liquid falls in drops or streams.

37. The method of claim 36 wherein said drops have diameters greater than about 200 microns,  
greater than about 350 microns, greater than about 500 microns, greater than about 1000  
microns, greater than about 2000 microns, or greater than about 5000 microns.

- 30   38. The method of claim 34 wherein said conduit is also in fluid communication with said liquid  
and said plant or a net basket or growth medium contacting said plant.

39. The method of claim 34 further comprising delivering a third portion of said liquid through said  
conduit whereby said third portion of liquid falls through said gas, contacts said one or more  
roots, and contacts said remaining liquid.

- 35   40. The method of claim 34 wherein said second portion of liquid contacts said plant or growth  
medium at about or below the height of the transition region of said plant or at about said  
seed.

41. The method of claim 34 for more than one plant or seed.

42. The method of claim 41 comprising delivering said second portion of liquid to each plant,  
40 seed, or cutting separately.

43. The method of claim 34 wherein said first portion of liquid only contacts said gas and said remaining liquid.
44. The method of claim 34 wherein said conduit has first and second exits and said method further comprises delivering said first and second portions of liquid through said first and second exits.
45. The method of claim 34 wherein said delivering is performed by pumping.
46. The method of claim 45 wherein said pumping is performed while said plant or said seed is germinating.
47. The method of claim 34 wherein said delivering comprises said first portion of liquid exiting said conduit substantially vertically downward.
48. The method of claim 34 further comprising increasing the dissolved oxygen content of said first and remaining portions of liquid when said first portion of liquid falls through said gas into said remaining liquid.
49. The method of claim 34 further comprising increasing the negative ions within said vessel when said first portion of liquid falls into said remaining liquid.
50. The method of claim 34 comprising continuously delivering said first and second liquid portions.
51. The method of claim 34 further comprising adding additional liquid to said device wherein said additional liquid is above pH 5.5.
52. The method of claim 34 comprising containing said liquid and all of said one or more roots in one vessel.
53. The method of claim 34 wherein said second portion of liquid contacts said plant or said seed and then descends to a first terrace of a terraced aerator, then descends from said first terrace to a second terrace of a terraced aerator, and then descends from said second terrace into said remaining liquid.
54. A method for delivering oxygen to a plant or seed which will germinate into a plant, said method comprising:
- a) providing a plant with at least one root or a seed which will germinate into a plant having at least one root;
  - b) providing a liquid capable of having oxygen dissolved therein;
  - c) providing a gas comprising oxygen gas;
  - d) providing a means for elevating and elevating a portion of said liquid above the remaining liquid;
  - e) allowing said portion of liquid to fall through said gas into said remaining liquid whereby oxygen gas dissolves in said portion of liquid or said remaining liquid thereby forming oxygenated liquid; and
  - f) providing a means for contacting and contacting said plant or seed with said oxygenated liquid.
55. The method of claim 54 wherein in step e) oxygen gas dissolves in said portion of liquid and said remaining liquid.

56. The method of claim 54 further comprising providing a downdraft venturi and providing a means for allowing and allowing a second portion of liquid to descend through said downdraft venturi into said remaining liquid thereby increasing the dissolved oxygen content of said second portion of liquid or said remaining liquid.
- 5 57. The method of claim 57 wherein the dissolved oxygen content is increased in said second portion and in said remaining liquid.
58. The method of claim 54 wherein said liquid falling through said gas into said remaining portion of liquid increases the humidity level of said gas.
59. The method of claim 58 further comprising contacting said root with said humidity.
- 10 60. The method of claim 54 further comprising contacting said root with said gas comprising oxygen.
61. The method of claim 54 further comprising allowing said root to grow in said oxygenated liquid.
62. The method of claim 54 further comprising splashing said root with said oxygenated liquid.
- 15 63. The method of 54 wherein after said portion of said oxygenated liquid falls through said gas and before said portion of liquid falls into said remaining oxygenated liquid, said portion of liquid contacts a terraced aerator.
64. A method for increasing the dissolved oxygen concentration in a liquid within a hydroponics device comprising:
- 20 a) providing a hydroponics device comprising: a vessel for containing a liquid; a means for removably suspending one or more of a plant, seed, a growth medium for contacting said plant or seed, and a net basket in a gas above said liquid; and a means for elevating a first portion and a second portion of said liquid above said remaining liquid and into said gas whereby said first portion of liquid falls through said
- 25 gas into the remaining liquid in said vessel, and whereby said second portion of liquid can contact said plant, said seed, or a growth medium contacting said plant or seed, and descends into said remaining liquid; whereby said root of said plant is permitted to grow in said gas and in said remaining liquid;
- 30 b) elevating said first portion of liquid above said remaining liquid and into said gas;
- c) elevating said second portion of liquid above said remaining liquid and into said gas;
- d) allowing said first portion of liquid to fall through said gas and into said remaining liquid; and
- e) allowing said second portion of liquid to contact said plant, seed, growth medium, or net basket and descend into said remaining liquid;
- 35 whereby the dissolved oxygen concentration in said first portion of liquid, in said remaining liquid, or in both is increased.
65. The method of claim 64 wherein said hydroponics device further comprises a terraced aerator, wherein after contacting said plant, seed, growth medium, or net basket, said second portion of liquid contacts said terraced aerator before descending into said remaining liquid.
- 40 66. The method of claim 64 wherein said hydroponics device is enclosed.

67. The method of claim 64 further comprising providing a downdraft venturi and providing a means for allowing and allowing a third portion of liquid or said first portion of liquid to descend through said downdraft venturi into said remaining liquid thereby increasing the dissolved oxygen content of said third or first portion of liquid or said remaining liquid, or both.
- 5 68. A hydroponics device for growing a plant or germinating a seed, said device comprising a terraced aerator for increasing the dissolved oxygen concentration of a liquid within said device.
69. The device of claim 68 wherein said terraced aerator comprises a flowform.
70. A terraced aerator comprising:
- 10 a) one or more terraces;
- b) a means for suspending said terraced aerator all or partially above a liquid reservoir; and below a plant, seed, or a growth medium suspending said plant or seed;
- wherein:
- 15 1) a liquid descending from said plant or seed or growth medium, through a gas comprising oxygen, to said first terrace; or
- 2) said liquid descending from said first terrace through a gas comprising oxygen into said liquid reservoir;
- increases the dissolved oxygen content in said liquid or in said liquid reservoir, or both; and wherein each of said liquid descending steps produces a sound of less than about 57
- 20 decibels or wherein each of said liquid descending steps dampens the sound produced compared to said liquid descending to said liquid reservoir without contacting said terraced aerator.
71. A terraced aerator comprising:
- 25 a) two or more terraces;
- b) a means for suspending said first terrace above said second terrace; and
- c) a means for suspending said terraced aerator all or partially above a liquid reservoir; and below a plant, seed, or a growth medium suspending said plant or seed;
- wherein:
- 30 1) a liquid descending from said plant or seed or growth medium, through a gas comprising oxygen, to said first terrace; and
- 2) said liquid descending from said first terrace through a gas comprising oxygen to said second terrace; or
- 3) said liquid descending from said second terrace through said gas into said liquid
- 35 reservoir; or
- 4) both 2) and 3);
- increases the dissolved oxygen content in said liquid or in said liquid reservoir, or both; and wherein each of said liquid descending steps produces a sound of less than about 57 decibels or wherein each of said liquid descending steps dampens the sound produced

compared to said liquid descending to said liquid reservoir without contacting said terraced aerator.

72. The terraced aerator of claim 71 wherein the combined liquid descending steps produces a sound of less than about 57 decibels.

5 73. The terraced aerator of claim 71 wherein said terraces have one or more holes for said liquid to pass through.

74. The terraced aerator of claim 73 wherein said one or more holes have diameters less than cross-sectional diameters of drops or streams of said descending liquid; or are less than 200 microns, less than about 200 microns, less than about 350 microns, less than about 500 microns, less than about 1000 microns, less than about 2000 microns, or less than about 5000 microns.

75. The terraced aerator of claim 71 wherein substantially all of the liquid descending from said first terrace contacts said second terrace.

76. The terraced aerator of 71 wherein substantially all of the liquid descending from said plant, seed, or growth medium contacts said first terrace.

77. The terraced aerator of claim 71 wherein the height distance between said first and second terraces is between about 0.5 inch and about 1 inch.

78. The terraced aerator of claim 71 wherein said terraces are capable of containing liquid.

79. The device of claim 71 wherein said second portion of liquid contacts said plant, seed, or growth medium and descends in drops into said remaining liquid, wherein each distance segment a drop falls between said first terrace and said second terrace or between said second terrace and said remaining liquid through said gas is the drop distance, wherein said device also comprises a means for decreasing or increasing said drop distance.

80. The terraced aerator of claim 71 for a hydroponics device.

25 81. The terraced aerator of claim 71 wherein one or more of said terraces is a flowform.

82. The terraced aerator of claim 71 wherein all of said terraces are flowforms.

83. A method for increasing the dissolved oxygen concentration in a liquid within a hydroponics device comprising:

30 a) providing a hydroponics device containing a liquid to be delivered to a plant; a gas comprising oxygen above said liquid; a means for elevating a portion of said liquid in said gas above the remaining liquid; a means for delivering said portion of liquid into said gas; and a terraced aerator suspended in said gas above said liquid;

b) elevating a portion of said liquid above said remaining liquid;

c) delivering said portion of liquid into said gas; and

35 d) allowing said portion of liquid to descend through said gas onto said terraced aerator and into said remaining portion of liquid;

wherein the dissolved oxygen concentration in said liquid is increased.

84. The method of claim 83 wherein said terraced aerator comprises a flowform.

40 85. An aspirator for increasing the dissolved oxygen concentration in a liquid in a hydroponics system, said aspirator comprising a tube in which said liquid flows, wherein said tube



comprises a gas inlet for receiving a gas comprising oxygen, whereby when said liquid flows through said tube said gas enters said tube and mixes with said liquid.

86. A downdraft venturi for increasing the dissolved oxygen concentration in a liquid in a hydroponics system, said venturi comprising:

- 5           a) a tube, said tube having an upper, first cross-sectional area and an area of transition to a lower, second, smaller cross-sectional area, said tube for descent of said liquid; and  
               b) a gas inlet into said tube at about said area of transition;

10           wherein descent of said portion of liquid through said tube draws a gas comprising oxygen into said gas inlet, whereby said gas mixes with said liquid and increases the dissolved oxygen concentration in said liquid.

87. The downdraft venturi of claim 86 wherein said upper portion of said tube described by said first cross-sectional diameter is about completely filled with said liquid.

88. The downdraft venturi of claim 86 wherein said tube empties into a liquid reservoir containing a reservoir liquid.

89. The downdraft venturi of claim 88 wherein said gas mixes with said liquid about as the liquid contacts the surface of the reservoir liquid.

90. A hydroponics device for growing a plant or germinating a seed, said device comprising a downdraft venturi for increasing the dissolved oxygen concentration of a liquid within said device.

91. The device of claim 90 that is enclosed.

92. The device of claim 90 further comprising:

- 25           a) a vessel for containing a liquid;  
               b) a means for removably suspending said plant in a gas above said liquid;  
               c) a conduit in fluid communication with said liquid and said gas; and  
               d) a means for delivering a first portion and a second portion of said liquid through said conduit whereby said first portion of liquid falls through said gas into the remaining liquid in said vessel and said second portion of liquid contacts said plant, seed, or a growth medium contacting said plant or seed, and descends into said remaining liquid;

30           whereby said root of said plant is permitted to grow in said gas and in said remaining liquid.

93. The device of claim 90 wherein said downdraft venturi comprises:

- 35           a) a tube, said tube having an upper, first cross-sectional diameter and an area of transition to a lower, second, smaller cross-sectional diameter, said tube for descent of a liquid; and  
               b) a gas inlet into said tube at about said area of transition;

              wherein descent of said portion of said liquid through said tube draws a gas comprising oxygen into said gas inlet, whereby said gas mixes with said liquid and increases the dissolved oxygen concentration in said liquid.

94. A method for increasing the dissolved oxygen concentration in a liquid to be delivered to a plant, said method comprising:
  - a) providing a liquid;
  - b) providing a downdraft venturi in a gas comprising oxygen;
  - 5 c) providing a means for delivering and delivering said liquid into the top of said downdraft venturi; and
  - d) allowing said liquid to descend through said downdraft venturi wherein said gas enters into said downdraft venturi and mixes with said liquid.
95. The method of claim 94 further comprising:
  - 10 a) providing a hydroponics device for containing said liquid, said gas, and said downdraft venturi; and
  - b) performing said delivering and said allowing steps within said hydroponics device.
96. A net basket for supporting and delivering liquid to a plant, a seed that will germinate into a plant, or a growth medium for contacting said seed or plant; said basket comprising at least  
15 one channel having a vertical component for transporting liquid wherein said plant or seed grows and wherein a root of said plant and said liquid are allowed to exit through one or more holes in said net basket.
97. The net basket of claim 96 also comprising at least one channel having a horizontal component for transporting liquid, wherein said channel having a horizontal component is in  
20 fluid contact with said channel having a vertical component.
98. The net basket of claim 97 wherein said liquid is delivered in a horizontal or downward direction or both directions to said plant or a growth medium supported by said net basket.
99. The net basket of claim 97 wherein said growth medium is a hydrophilic cellular substrate that expands when contacted by said liquid.
- 25 100. The net basket of claim 97 wherein said liquid is directed to a side or bottom surface or both surfaces of said growth medium.
101. The net basket of claim 97 further comprising a means for substantially preventing said liquid from contacting the uppermost surface of said growth medium.
102. The net basket of claim 97 also comprising a clog prevention means for preventing said  
30 growth medium from clogging one or both of said channels.
103. The net basket of claim 102 wherein said clog prevention means is removable.
104. The net basket of claim 102 wherein said channel having a horizontal component comprises a proximal wall and a distal wall and said clog prevention means comprises a proximal wall of said channel having a horizontal component.
- 35 105. The net basket of claim 104 wherein said proximal wall contacts and substantially sealingly contacts a distal wall of said channel having a horizontal component at about the top of said channel.
106. The net basket of claim 102 wherein said channel having a vertical component comprises a proximal edge and wherein said clog prevention means comprises a proximal edge of said  
40 channel having a vertical component.

107. The net basket of claim 97 also comprising a means for suspending said plant or seed in a hydroponics device.
108. The net basket of claim 97 wherein said channel having a vertical component is a substantially vertical channel.
- 5 109. The net basket of claim 108 having four substantially vertical channels.
110. The net basket of claim 97 wherein said channel having a horizontal component is a substantially horizontal channel.
111. The net basket of claim 110 having two or more substantially horizontal channels.
112. The net basket of claim 110 wherein said horizontal channel is at about the bottom of said net basket.
- 10 113. The net basket of claim 112 wherein a growth medium supported by said net basket rests upon at least a portion of said horizontal channel.
114. The net basket of claim 112 wherein said horizontal channel retains a portion of said liquid.
115. The net basket of claim 110 wherein said horizontal channel contacts said channel having a vertical component at about the top of said channel having a vertical component.
- 15 116. The net basket of claim 97 wherein said basket has a perimeter wall having a proximal side wherein said channel having a horizontal component contacts the proximal side of a perimeter wall of said net basket.
117. The net basket of claim 97 having two or more channels each having a vertical component equally spaced around said basket.
- 20 118. The net basket of claim 97 also comprising a liquid inlet at about the top of said channel having a vertical component.
119. The net basket of claim 118 wherein said liquid inlet is at about the height of the transition region of said plant.
- 25 120. The net basket of claim 97 wherein said liquid channel is U-shaped or L-shaped.
121. The net basket of claim 97 wherein said liquid channel having a vertical component is an open channel and is open on the proximal side.
122. The net basket of claim 97 wherein said liquid is delivered to said plant or seed through said channel having a vertical component.
- 30 123. The net basket of claim 97 wherein said liquid is first transported through said channel having a vertical component, then through said channel having a horizontal component, and is then delivered to said growth medium.
124. The net basket of claim 97 wherein said growth medium is a soil-less growth medium.
125. The net basket of claim 97 comprising:
- 35 a) four U-shaped horizontal channels at about the top of said net basket;
- b) four U-shaped vertical channels descending from said four horizontal channels wherein each vertical channel contacts two horizontal channels;
- c) a fifth L-shaped horizontal channel at about the bottom of said four vertical channels and at about the bottom of said net basket; and
- 40 d) four liquid inlets at about the center of each of said four horizontal channels;

wherein said liquid enters said net basket at said four liquid inlets, is transported along said four horizontal channels, is transported down said four vertical channels to said fifth horizontal channel, and exits said net basket through an opening in the bottom of said net basket.

126. The net basket of claim 125 wherein said liquid contacts a growth medium supported by said net basket while being transported down said four vertical channels or while in said fifth horizontal channel, or both.
127. A method for delivering liquid to a plant or seed that will germinate into a plant comprising:
- a) providing a net basket for supporting said plant or seed, said net basket comprising a liquid inlet and a channel having a vertical component for transporting said liquid;
  - b) delivering a liquid to said liquid inlet;
  - c) transporting said liquid through said liquid inlet to said channel having a vertical component;
  - d) transporting said liquid through said channel having a vertical component; and
  - e) contacting said plant or seed with said liquid;
- wherein said plant grows and wherein one or more roots of said plant and said liquid are allowed to exit through one or more holes in said net basket.
128. The method of claim 127 wherein said net basket also supports a growth medium contacting said plant or seed, wherein said liquid first contacts said growth medium and then contacts said plant or seed.
129. The method of claim 127 comprising:
- a) providing a net basket also comprising a channel having a horizontal component for transporting a liquid; and
  - b) transporting said liquid to said channel having a horizontal component before or after transporting said liquid to said channel having a vertical component.
130. A germination cap for increasing the likelihood of germination of a seed relative to an equivalent context without said cap, said cap comprising:
- a) a panel comprising at least a partially converging, diverging, refracting, or polarizing lens; and
  - b) a means for supporting said panel between a photoradiation source and said seed;
- wherein said panel is at least partially permeable to photoradiation from said photoradiation source.
131. The germination cap of claim 130 further comprising a means for increasing the temperature of said seed.
132. The germination cap of claim 130 further comprising a means for decreasing evaporation of a liquid contacting said seed.
133. The germination cap of claim 130 wherein said means for supporting said panel comprises one or more walls that contact the lens and are able to contact a growth medium or growing surface near said seed.

134. The germination cap of claim 133 wherein said one or more walls form an airtight seal with said lens and said growth medium or growing surface, thereby decreasing evaporation of a liquid contacting said seed or increasing the temperature of said seed or both.
- 5 135. The germination cap of claim 130 wherein said lens is selected from the group consisting of concave lenses, convex lenses, fresnel lenses, concave-concave lenses, plano-plano lenses, convex-convex lenses, plano-concave lenses, and plano-convex lenses.
136. The germination cap of claim 130 wherein said lens comprises a diffraction grating.
137. The germination cap of claim 130 for a hydroponics device.
- 10 138. The germination cap of claim 137 wherein said cap decreases evaporation of a liquid within said hydroponics device.
139. The germination cap of claim 130 wherein said cap is translucent or transparent.
140. The germination cap of claim 130 wherein said cap is made from a material selected from the group consisting of glass, plastic, paper, and other photopermeable materials.
141. The germination cap of claim 130 wherein said photoradiation source is natural or artificial.
- 15 142. The germination cap of claim 130 wherein said panel is about flat or curved.
143. The germination cap of claim 142 wherein said panel is curved and a cross-section of said panel approximates an arc of a circle.
144. The germination cap of claim 130 wherein said cap is in the form of a covered cylindrical tube.
- 20 145. The germination cap of claim 130 wherein said cap creates about a greenhouse or terrarium environment.
146. The germination cap of claim 130 wherein said means for supporting said panel supports said panel far enough away from said seed whereby said seed can germinate and grow for at least about 24 hours before the plant germinating from said seed contacts said germination cap.
- 25 147. The germination cap of claim 130 wherein said seed has a greater likelihood of germination with increased photoradiation and said lens is converging or wherein said seed has a greater likelihood of germination with decreased photoradiation and said lens is diverging.
148. The germination cap of claim 130 wherein said lens is converging and photoradiation produced by said photoradiation source is focused on said seed or wherein said lens is diverging and photoradiation produced by said photoradiation source is focused away from said seed.
- 30 149. A set of germination caps for increasing the likelihood of germination of a plurality of seed types relative to an equivalent context without said set of caps comprising two or more germination caps of claim 130 wherein a first germination cap comprises a converging lens and wherein a second germination cap comprises a diverging lens.
- 35 150. A method for increasing the likelihood of germination of a seed comprising:
- a) providing a seed;
  - b) providing a liquid and a means for contacting said seed with said liquid;
  - c) providing a photoradiation source for delivering photoradiation to said seed;
  - d) providing a germination cap of claim 130;
  - 40 e) contacting said seed with said liquid;

- f) delivering said photoradiation initially at said seed; and  
g) converging or diverging said photoradiation towards or away from said seed;  
wherein said likelihood of germination of said seed is increased relative to delivering said photoradiation without converging or diverging.
- 5 151. A set of germination caps for increasing the likelihood of germination of a plurality of seed types relative to an equivalent context without said set of caps comprising two or more germination caps wherein a first germination cap comprises:
- 10 a) a first panel comprising at least a partially converging lens; and  
b) a means for supporting said first panel between a photoradiation source and said plurality of seed types; and  
a second germination cap comprising:
- 1) a second panel comprising at least a partially diverging lens; and  
2) a means for supporting said second panel between a photoradiation source and said plurality of seed types;
- 15 wherein said first and second panels are at least partially permeable to photoradiation from said photoradiation source.
152. The set of germination caps of claim 151 wherein said plurality of seed types comprises a lettuce seed and a cilantro seed wherein said first photoradiation converging cap is useful for increasing the likelihood of germination of said lettuce seed and wherein said second photoradiation diverging cap is useful for increasing the likelihood of germination of said cilantro seed.
- 20 153. A method for increasing the likelihood of germination of a seed comprising:
- a) providing a seed;  
b) providing a liquid and a means for contacting said seed with said liquid;  
25 c) providing a photoradiation source for delivering photoradiation to said seed;  
d) providing a means for converging or diverging said photoradiation towards or away from said seed;  
e) contacting said seed with said liquid; and  
f) delivering said photoradiation to said seed comprising converging or diverging  
30 said photoradiation towards or away from said seed;  
wherein said likelihood of germination of said seed is increased relative to delivering said photoradiation without converging or diverging said photoradiation.
154. The method of claim 153 wherein said means for converging or diverging said photoradiation comprises covering said seed with a germination cap.
- 35 155. The method of claim 154 wherein said germination cap comprises:
- a) a panel comprising at least a partially converging or diverging lens; and  
b) a means for supporting said panel between a photoradiation source and said seed;  
wherein said panel is at least partially permeable to photoradiation from said photoradiation source.
- 40 156. The method of claim 153 performed using a hydroponics device.

157. A method for increasing the likelihood of germination of a plurality of seed types, said method comprising:
- a) providing a plurality of seed types comprising a first seed and a second seed;
  - b) providing a liquid and a means for contacting said first and second seeds with said liquid;
  - c) providing a photoradiation source for delivering photoradiation to said first and second seeds;
  - d) providing a means for converging or diverging said photoradiation towards or away from each said first and second seeds;
  - e) contacting said first and second seeds with said liquid;
  - f) delivering said photoradiation to said first seed comprising converging said photoradiation towards said first seed; and
  - g) delivering said photoradiation to said second seed comprising diverging said photoradiation away from said second seed;
- wherein said likelihood of germination of said seed is increased relative to delivering said photoradiation without converging or diverging said photoradiation.
158. A seed-support medium comprising:
- a) a seed-bearing substrate superposed upon
  - b) a plant growth medium contained within
  - c) a modular receptacle.
159. The seed support medium of claim 158 wherein the growth medium is a hydrophilic cellular substrate.
160. The seed support medium of claim 158 wherein the modular receptacle has a characteristic selected from the group consisting of: rigid, porous, and cup-shaped.
161. The medium of claim 158 wherein the seed-bearing substrate is a hydrophilic fiber or is plant starch.
162. The medium of claim 158 wherein the plant growth medium is soil-less.
163. The medium of claim 158 wherein the seed-bearing substrate is an adhesive.
164. The medium of claim 158 wherein the seed-bearing substrate comprises adjuvants.
165. The medium of claim 158 wherein the plant growth medium is a synthetic polymer or a sponge.
166. The medium of claim 158 wherein said seed-bearing substrate comprises two or more types of seeds.
167. The medium of claim 158 wherein the plant growth medium is rock wool.
168. The medium of claim 158 wherein the plant growth medium comprises adjuvants.
169. A medium of claim 158 further comprising a seal.
170. The medium of claim 169 wherein the seal is at least partially opaque.
171. The medium of claim 169 wherein the seal is at least partially transparent.
172. The medium of claim 169 wherein the seal is at least partially translucent.
173. A seed-support medium comprising:

- a) a seed-bearing hydrophilic cellular polymer substrate contained within
  - b) a modular rigid receptacle.
- 174. The medium according to claim 173 wherein the growth medium is a synthetic polymer.
- 175. The medium according to claim 173 wherein plant growth medium is sponge.
- 5 176. The medium according to claim 173 wherein the plant growth medium is rock wool.
- 177. The medium according to claim 173 wherein the plant growth medium further comprises adjuvants.
- 178. The medium according to claim 173 further comprising a seal.
- 179. A method for germinating a seed comprising:
  - 10 a) placing a seed supporting and germinating medium comprising a seed-bearing substrate superposed upon a growth medium contained within a modular, rigid receptacle;
  - b) delivering an aqueous liquid to the seed; and
  - c) allowing the seed to germinate.
- 180. The method of claim 179 wherein said seed supporting and germinating medium is placed in
  - 15 a hydroponics device and the aqueous liquid is delivered by turning on the hydroponic device thus allowing liquid nutrient to contact the supporting and germinating medium.
- 181. The method of claim 180 wherein the hydroponics device is an aeroponics device.
- 182. The method of claim 179 also comprising delivering photoradiation to the seed before step c).
- 183. A smart garden device for a hydroponics device, said hydroponics device having at least one
  - 20 characteristic or component, said smart garden device comprising:
    - a) means for delivering electricity to said smart garden device;
    - b) at least one timer; and
    - c) means for determining, receiving, sending, or processing data regarding the status of said component or characteristic of said hydroponics device.
- 25 184. The smart garden device of claim 183 also comprising a means for displaying the status of said component or characteristic.
- 185. The smart garden device of claim 184 comprising a means for displaying the status of requirement to add nutrient or for displaying the status of requirement to add water or both.
- 186. The smart garden device of claim 184 comprising means for displaying the status of
  - 30 requirement to add liquid nutrient solution.
- 187. The smart garden device of claim 184 comprising a timer for display of a requirement to add nutrient.
- 188. The smart garden device of claim 187 wherein said timer has a two-week cycle.
- 189. The smart garden device of claim 183, wherein said hydroponics device also having a second
  - 35 component or characteristic, said smart garden device also comprising a means for determining, receiving, sending, or processing data regarding the status of the second component or characteristic of said hydroponics device or said smart garden device also comprising a means for displaying the status of said second component or characteristic or both.



190. The smart garden device of claim 189 wherein said first and second components or characteristics are the same.
191. The smart garden device of claim 189 wherein the first and second components or characteristics are different.
- 5 192. The smart garden device of claim 183 wherein said component or characteristic is selected from the group consisting of: timers, timing cycles, photoradiation sources, pumps, need for nutrient, need for liquid within said device, humidity, root density, nutrient concentration, dissolved oxygen concentration, turbidity of liquid within said device, incident photoradiation, temperature, and plant mass.
- 10 193. The smart garden device of claim 183 wherein said liquid is water.
194. The smart garden device of claim 183 wherein said liquid is liquid nutrient solution.
195. The smart garden device of claim 183 wherein said means for determining, receiving, sending, or processing data comprises a preprogrammed storage device.
- 15 196. The smart garden device of claim 195 wherein the preprogrammed storage device is a circuit board.
197. The smart garden device of claim 196 wherein the preprogrammed storage device is a computer chip.
198. The smart garden device of claim 183 wherein said means for determining, receiving, send or processing data comprises a programmable storage device.
- 20 199. The smart garden device of claim 198 wherein the programmable storage device is a circuit board.
200. The smart garden device of claim 198 wherein the programmable storage device is a computer chip.
- 25 201. The smart garden device of claim 183 comprising a means for determining, receiving, sending, or processing data regarding the status of two or more components or characteristics of said device and a means for displaying the status of two or more components or characteristics of said device.
- 30 202. The smart garden device of claim 183 comprising a means for receiving data regarding the status of a photoradiation source, resetting a timer for the requirement to add nutrient, and selection of a timing cycle for a photoradiation source or a pump or both.
203. The smart garden device of claim 183 comprising a timer for a photoradiation source and a pump.
204. The smart garden device of claim 203 further comprising a plurality of timing cycles for said timer.
- 35 205. The smart garden device of claim 204 wherein said timing cycles are selected from the group consisting of: 24 hours on, 24 hours off, 20 hours on and 4 hours off, 18 hours on and 6 hours off, 16 hours on and 8 hours off, 14 hours on and 10 hours off, and 12 hours on and 12 hours off.
- 40 206. The smart garden device of claim 183 further comprising a liquid level gauge and a means for detecting a signal from the liquid level gauge.

207. The smart garden device of claim 206 wherein means for detecting a signal from a liquid level gauge is a photocell.
208. The aspirator of claim 85 wherein said aspirator is a downdraft venturi.
209. The smart garden device of claim 183 also comprising a means for sending data to or receiving data from an external programmable storage device.
210. The smart garden device of claim 209 wherein said external programmable storage device is accessed through the internet.
211. A device for growing a plant or germinating a seed into a plant, wherein said plant may have one or more roots, said device for covering a vessel for containing a liquid, said device comprising:
- a) a means for removably suspending said plant in a gas above said liquid;
  - b) a means for elevating a first portion of said liquid above the remaining liquid in said vessel and into said gas wherein said first portion of liquid falls through said gas into said remaining liquid; and
  - c) a means for contacting a second portion of said liquid with said plant, seed, or a growth medium contacting said plant or seed and allowing said second portion of liquid to return to the remaining liquid;
- whereby said one or more roots are permitted to grow in said gas and in said remaining liquid.
212. A method for making a seed-bearing support medium comprising:
- a) placing a seed upon a plant growth medium; and
  - b) placing said plant growth medium within a modular receptacle;
- or
- c) placing a plant growth medium within a modular receptacle; and
  - d) placing a seed upon said plant growth medium within said modular receptacle.
213. The method of claim 212 wherein step b) or step d) comprises placing a seed-bearing substrate upon said plant growth medium.
214. A set of seed support media comprising: a first seed-bearing hydrophilic cellular polymer substrate contained within a first modular rigid receptacle and a second seed-bearing hydrophilic cellular polymer substrate contained within a second modular rigid receptacle wherein said first seed is of a different variety or species than said second seed.
215. The seed support medium of claim 158 wherein the modular receptacle is a net basket.